

## CLAIMS

1           1. Device for determining the allowable UV exposure time and/or UV radiation dose of  
2 human skin, with at least one UV emitter (7) for emitting UV radiation, at least one UV sensor  
3 (8) for receiving the UV radiation diffusely radiated in and/or on the skin (11), and an evaluation  
4 unit for determining the radiation absorption.

1           2. Device in accordance with Claim 1, characterized by the fact that the UV emitter (7)  
2 emits UV radiation at which an absorption coefficient  $\mu_s$  is greater than or equal to a scattering  
3 coefficient  $\mu_a$ .

1           3. Device in accordance with one or more of the preceding claims, characterized by the  
2 fact that the UV emitter (7) emits UV radiation with a wavelength smaller than the diameter of a  
3 cell nucleus.

1           4. Device in accordance with one or more of the preceding claims, characterized by the  
2 fact that the UV emitter (7) emits UV radiation with a wavelength of 345 nm to 355 nm.

1           5. Device in accordance with one or more of the preceding claims, characterized by the  
2 fact that at least one UV emitter (7) and/or at least one UV sensor (8) is arranged in a housing (9)  
3 of a hand-held measuring instrument.

1           6. Device in accordance with one or more of the preceding claims, characterized by the  
2 fact that the housing (9) has an application surface (10) for placing it on the skin (11) of a  
3 subject, and that the UV emitter (7) and the UV sensor (8) are arranged at an angle relative to  
4 each other in such a way that a reflection of a ray on the optical axes (12, 13) of the UV emitter  
5 (7) and the UV sensor (8) occurs at a depth of penetration (e) of up to 1 mm below the

6 application surface (10).

1 7. Device in accordance with one or more of the preceding claims, characterized by the  
2 fact that the depth of penetration (e) is adjustable.

1 8. Device in accordance with one or more of the preceding claims, characterized by the  
2 fact that the optical axes (12, 13) span an angle ( $\alpha$ ) of 70° to 110°.

1 9. Device in accordance with one or more of the preceding claims, characterized by the  
2 fact that the angle ( $\alpha$ ) can be adjusted to vary the depth of penetration (e).

1 10. Device in accordance with one or more of the preceding claims, characterized by the  
2 fact that the height and/or the distance of the UV emitter (7) and the UV sensor (8) above the  
3 application surface (10) can be adjusted in order to vary the depth of penetration (e).

1 11. Device in accordance with one or more of the preceding claims, characterized by the  
2 fact that a processor unit computes a mean value of several measurements.

1 12. Device in accordance with one or more of the preceding claims, characterized by the  
2 fact that the processor unit assigns a threshold dose to a measurement and/or a mean value of  
3 several measurements.

1 13. Device in accordance with one or more of the preceding claims, characterized by the  
2 fact that the fraction of erythemally-effective UV radiation from a radiation source is stored in an  
3 electronic memory and that the processor unit computes the maximum exposure time and/or  
4 radiation dose.

1           14. Device in accordance with one or more of the preceding claims, characterized by the  
2 fact that an interface (15, 17, 18) is provided, by which data can be stored and retrieved.

1           15. Device in accordance with one or more of the preceding claims, characterized by the  
2 fact that at least one radiation source is operated via the interface.

1           16. Device, especially in accordance with one or more of the preceding claims,  
2 characterized by the fact that a housing (9) has two pairs of UV sensors (20, 21; 22, 23), that in  
3 each pair, the UV sensors (20, 21; 22, 23) are oppositely oriented, and that the two pairs are  
4 arranged at an angle of 90° relative to each other.

1           17. Device in accordance with one or more of the preceding claims, characterized by the  
2 fact that the UV sensors (20, 21; 22, 23) are formed by free ends of optical waveguides (24-27).

1           18. Device in accordance with one or more of the preceding claims, characterized by the  
2 fact that a filter mimic is assigned to a free end of an optical waveguide and that the filter mimic  
3 causes a short-wave component of the diffusely reflected radiation to be reflected to a greater  
4 extent than a long-wave component.

1           19. Device in accordance with one or more of the preceding claims, characterized by the  
2 fact that optical waveguides (24-27) end at a common, second UV sensor (33).

1           20. Device in accordance with one or more of the preceding claims, characterized by the  
2 fact that the four optical waveguides (24-27) end at a common, second UV sensor (33).

1           21. Device in accordance with one or more of the preceding claims, characterized by the  
2 fact that the second UV sensor (33) has a linear characteristic curve over the erythema-effective

3 spectrum.

1 22. Device in accordance with one or more of Claims 1 to 19, characterized by the fact  
2 that the second sensor has a characteristic curve that conforms to the erythemally-effective  
3 spectrum.

1 23. Device in accordance with one or more of the preceding claims, characterized by the  
2 fact that distance between a pair of UV sensors (20, 21) corresponds to the height of a human  
3 body on a tanning bed.

1 24. Device in accordance with one or more of the preceding claims, characterized by the  
2 fact that a distance measuring instrument (34) is provided.

1 25. Device in accordance with one or more of the preceding claims, characterized by the  
2 fact that a temperature sensor (35) is provided.

1 26. Device in accordance with one or more of the preceding claims, characterized by the  
2 fact that a UV measurement is initiated by the temperature sensor (35) when an optimum bulb  
3 wall temperature of a UV radiation source to be measured in a tanning bed or the like has been  
4 reached.

1 27. Device in accordance with one or more of the preceding claims, characterized by an  
2 associated data bank for storing the data measured by the second UV sensor (33).

1 28. Device in accordance with one or more of the preceding claims, characterized by the  
2 fact that the processor unit computes the maximum exposure time and/or radiation dose from the  
3 individual data of a subject and a UV radiation source.

1           29. Device in accordance with one or more of the preceding claims, characterized by the  
2 fact that when the maximum exposure time and/or radiation dose is reached, the UV radiation  
3 source is shut off.

1           30. Method for determining the allowable UV exposure time and/or UV radiation dose  
2 of human skin, especially with a device in accordance with one or more of the preceding claims,  
3 characterized by an individual measurement of the absorption of the erythemally-effective UV  
4 radiation in the layer of a subject's skin that develops hyperkeratosis and by the assignment of a  
5 UV radiation threshold value.

1           31. Method in accordance with Claim 26, characterized by the fact that the measurement  
2 is carried out by means of direct UV irradiation.

1           32. Method in accordance with Claim 26, characterized by the fact that the measurement  
2 is carried out by means of fluorescence photometry.

1           33. Method in accordance with one of more of the preceding claims, characterized by the  
2 fact that a mean value of several individual measurements is taken.

1           34. Method in accordance with one of more of the preceding claims, characterized by the  
2 fact that the individual measurements are made at different sites.

1           35. Method in accordance with one of more of the preceding claims, characterized by the  
2 fact that the individual measurements are made at different skin depths.

1           36. Method in accordance with one of more of the preceding claims, characterized by the

2 fact that a maximum exposure time and/or radiation dose is determined from the threshold value  
3 and stored data of a UV radiation source.

1 37. Method in accordance with one of more of the preceding claims, characterized by the  
2 fact that the data are actual data derived from a measurement of the UV radiation source.

1 38. Method in accordance with one of more of the preceding claims, characterized by its  
2 use during an irradiation treatment of a subject.